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ASCLEPIAS CORNUTI AND ASCLEPIAS TUBEROSA.

By Fred. B. Quackenbush.

Read at the Pharmaceutical Meeting, February 19.

An analysis of Asclepias tuberosa was made in 1861 by Elam Rhoads,[1] who announced the presence of a peculiar principle possessing the taste of the root which he obtained from a concentrated infusion of the drug by precipitation with tannic acid.

In 1881, W. L. Hinchman[2] observed in Asclepias Cornuti a crystalline principle, but obtained it in a different manner. He treated the drug with petroleum ether, evaporated spontaneously and treated the residue with 95 per cent. alcohol from which yellow wart-like crystals were deposited which after purification were white. List, in 1849, also separated a crystalline principle from the milk juice by exhausting the congealed juice with ether.

The Asclepias Cornuti used in the following analysis was collected and carefully dried by Prof. Henry Trimble during the summer of 1888.

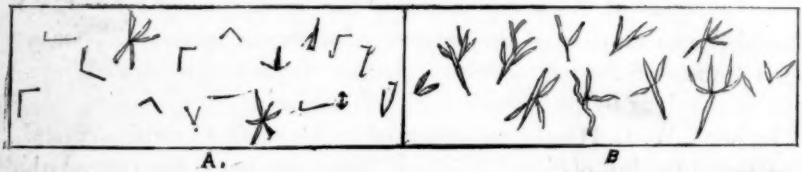
A complete analysis of the Ascelepias tuberosa was not made, but it was examined for the purpose of learning if the crystalline principle which was found in the Asclepias Cornuti also existed in it.

Fifty grams of the powdered root were macerated with petroleum ether in several portions. This solution showed a distinct fluorescence similar to that observed in petrolatum, and yielded on evaporation 1·44 per cent. of a peculiar residue supposed to consist of caoutchouc, resin and volatile oil to the extent of 2 per cent. This residue was insol-

[1] Amer. Jour. Phar., 1861, p. 493.
[2] Amer. Jour. Phar., 1881, p. 433.

uble in 95 per cent. alcohol, slightly soluble in absolute alcohol, and very soluble in ether and chloroform.

The residue of the drug was next treated with stronger ether in the same manner as with the petroleum ether. This ethereal solution gave the same fluorescence as the petroleum ether and yielded on evaporation 1·3 per cent. of residue. This residue was treated successively with water, water containing 1 per cent. hydrochloric acid and with water made slightly alkaline with potassium hydrate. The former gave no response to tests for glucosides, alkaloids or gallic acid. The second, which gave a distinct test for glucosides, on being neutralized with sodium hydrate deposited a flocculent precipitate. This solution containing the precipitate was agitated with stronger ether, which on spontaneous evaporation deposited a small quantity of crystals, which upon recrystallization assumed the form shown in Fig. A.



A. B

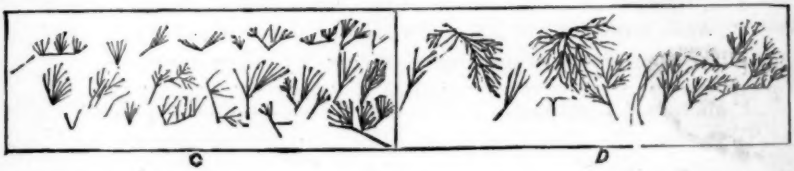
The alkaline solution gave negative tests as in the case of the aqueous solution.

One hundred grams of the powdered root of Asclepias tuberosa were macerated in petroleum ether and stronger ether and the residue from the ether solution treated with acidulated water as in the case of the Asclepias Cornuti. From this solution crystals were obtained by agitation with ether and evaporation of the ethereal solution. These crystals upon recrystallization from ether had the form as shown in Fig. B.

The residue of the Asclepias Cornuti was next exhausted with absolute alcohol. This alcoholic solution also showed the fluorescence as noted in the other solvents and yielded 3·58 per cent. of residue, which was completely soluble in water, and was taken up in that liquid and the tests applied for tannin and alkaloids with negative results. It, however, responded to the tests for glucosides. The aqueous solution was then agitated with petroleum ether, ether and chloroform. The ether and chloroform solutions both deposited crystals which recrystallized from ether in the form shown in Fig. C. The aqueous solution after treatment as stated above was made alkaline

and again agitated with the same solvents. I obtained no crystals from these solutions, but the petroleum ether gave a peculiar residue, having an odor analogous to that of musk, and which is probably the odorous principle observed by Rhoads in 1861.

The residue of the Asclepias tuberosa was next exhausted with absolute alcohol, and the alcoholic solution treated in the same manner as was the Asclepias Cornuti. The aqueous solution of the residue upon agitation with ether and evaporation of the ethereal solution yielded crystals which, on redissolving in ether, crystallized from that liquid in the form shown in Fig. D. The crystals obtained from both the ether and alcohol appear to be one and the same compound. The



crystals all reduced Fehling's solution and gave the following color reactions:

(*a*) With sulphuric acid they gave first a brown color, gradually changing to a blackish brown.

(*b*) With sulphuric acid and bichromate potassium they assumed at first a deep brown color, but on allowing to stand thirty minutes a purple color was produced which was very distinct in thin layers.

(*c*) Nitric acid after some time produced a slight pinkish color.

(*d*) Hydrochloric acid and ferric chloride developed no change of color.

This principle exists in the drug in very small quantities, only enough being obtained from one hundred grams of the drug to make the tests as given above.

The residue of the Asclepias Cornuti was then treated successively with water, a weak alkaline solution, a 1 per cent. acid solution and chlorine water.

In these solutions were found, by the usual methods of detection and estimation, sugar, 5·16 per cent., of which 3·29 per cent. was saccharose. Mucilage, 3·6 per cent.; trace of dextrin; albuminoids, 2·4 per cent.; calcium oxalate, 2·75 per cent.; coloring matter, 8·92 per cent.

The drug contained 7·16 per cent. of moisture and 5·35 per cent. of

ash. The drug, after exhausting with all the solvents, was found to consist of 49·86 per cent. of cellulin and lignin.

The results of the analysis may be summed up as follows:

Petroleum ether extracted		1·44	
Ether extracted		1·30	
Absolute alcohol extracted		3·58	
			6·32
Water—	Saccharose	3.29	
	Glucose	1·87	
	Mucilage	3·60	
	Undetermined compounds	3·22	
			11·98
Alkaline solution			3·91
Acid solution			4·36
Chlorine water			8·92
Moisture			7·16
Ash			5·35
Cellulin and Lignin			49·86
Loss			2·14
Total			100·00

In addition to the above, starch was also found, but was not estimated.

This drug contains many of the usual plant constituents, also caoutchouc, and a crystalline glucoside having a slightly bitter taste, and also resembling the taste of the root. This principle is probably identical with the bitter principle observed by Hinchman in 1881, and possibly the same principle observed by Rhoads in 1861. The fluorescence noted in the alcoholic and ethereal solutions I believe to be due to the glucoside found, although I did not obtain it in sufficient quantity to fully establish this fact.

Rhoads and Hinchman also announced the presence of tannin, but I was unable to verify their statement. It was not observed in the course of the regular analysis, and special tests with the powdered drug failed to confirm its presence.

Poisoning with oil of sassafras.— A case is related in the *Cincinnati Lancet-Clinic*, December 8, 1888, by Dr. L. M. Albright, when a teaspoonful of the oil was taken by a young man, producing hallucinations, vomiting, prostration, cold extremities, low pulse, somewhat dilated pupils and stupor. The treatment commenced two hours after taking the oil, consisted in rest, heat to the extremities, and egg-nog. The patient soon regained consciousness, and was ready for breakfast the next morning.

IMMATURE CUBEBS.

By C. B. Lowe.

Read at the Pharmaceutical Meeting, February 19th.

One of the wholesale firms of this city lately received from a New York importer a sample of what was represented to be cubebs. They are about one-third the size of true cubebs, with a stipe about one-third longer than their diameter, are of a dark purple color, quite shrunken appearance, and of a cubeb odor, but much weaker taste.

On examination with the microscope they are seen to contain numerous oil cells in the mesocarp, but the layer of stone cells which forms the endocarp in the true cubebs can not be discerned.

They contain a very rudimentary seed. In my opinion they are cubebs which have been picked while quite immature, the present high price of cubebs, probably, having tempted the growers to put them upon the market in this condition.

ON THE COMPOSITION OF HYDRANGIN.

By Hermann J. M. Schroeter, Ph. G.

A contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.
Read at the Pharmaceutical Meeting, February 19th.

A proximate analysis of Hydrangea arborescens, and a description of the active principle, hydrangin, was published in the Amer. Jour. of Pharmacy, March, 1887, by C. S. Bondurant. He showed the principle which he had discovered to be a glucoside, and gave a process for preparing it, but was unable to pursue his investigations. The object of this paper is to continue this work and determine the ultimate composition of this interesting compound.

Five kilos of the finely powdered drug were percolated to exhaustion with 96 per cent. methyl alcohol. The alcohol was recovered by distillation in vacuo, and the dark-brown extract further reduced by placing over sulphuric acid. Various experiments were made on the best method for extracting the principle. A portion of the extract was treated with petroleum ether to remove fat, etc, but it was found that this solvent dissolved an appreciable quantity of the principle, therefore this treatment was omitted with the bulk of the extract. The residue was then treated with successive portions of a one per cent. aqueous solution of sulphuric acid. This solution was col-

ored reddish, and to remove coloring matter was treated with chloroform, which solvent also extracted some of the principle. The acid solution was next treated with ether, and upon evaporation the slightly reddish colored hydrangin was deposited. To further purify, it was dissolved in absolute alcohol and treated with animal charcoal. This colorless solution was then evaporated under reduced pressure, and upon recrystallization from the same solvent, the principle was deposited in well-defined stellate clusters of pure white crystals. The drug used was apparently of poor quality, the yield being only 0·08 p. c.; it was stated by Mr. Bondurant to probably contain about 0·8 to 1 per cent. of the glucoside.

Some of the crystals were pulverized and dried over sulphuric acid. On heating to 110°C, no loss occurred, showing absence of water of crystallization. Tests for nitrogen gave negative results.

Four combustions with cupric oxide gave following results.—

	1.	2.	3.	4.	mean	Calculated for $(C_{24}H_{28}O_{11})\times$.
C.	67.05	66·85	66·97	66·84	66·93	66·99
H.	4·03	4·05	4·31	4·19	4·14	4·10
O.	28·92	29·10	28·72	28·97	28·93	28·91

Experiments on the physical and chemical properties of hydrangin compared well with those stated by Mr. Bondurant, with but few exceptions. Its melting point was found to be 228°C., instead of 235°C., and the solidifying point at 217°C. Mention was also made that hydrangin dissolves in concentrated sulphuric acid without color. On dissolving a portion in concentrated H_2SO_4, a distinct violet red fluorescence was observed, although not quite as strong at that produced by an alkali, which is intense opal blue. On addition of 5 volumes of water to the solution in H_2SO_4, the fluorescence was destroyed; the addition of ammonia to the same solution destroyed the color also, but on neutralizing the solution, the characteristic opal blue fluorescence reappeared. The substance was also found to be soluble in 80 per cent. acetic acid with slight fluorescence, which became more decided on dilution with 5 to 10 volumes of water.

The decomposition product of hydrangin, obtained by boiling with a dilute acid, was found to be soluble in chloroform, which deposited it as a brownish resin-like body.

BROMATES OF THE CINCHONA ALKALOIDS.

By Claude Grant Johnson, Ph. G.

From an Inaugural Essay.

Bromates have of late been receiving some attention as therapeutic agents, although they have not yet come into any general notice. Almost all of the inorganic compounds of bromic acid have been made, but none of its alkaloidal salts seem to have been produced until quite recently. It is claimed for the bromates of the metals that they give all of the effects of the corresponding bromides with the advantage of being more gratefully received by the system, which is able to endure them for a longer time without the unpleasant after effects usually following upon an extended treatment. They have been used in chorea, epilepsy, alcoholism and other diseases with good results. "They are for the most part crystallizable, but many of them decompose when their solutions are heated. When heated to redness, they either give off oxygen, leaving bromides, or give off bromine, and part of their oxygen, leaving oxides."—(Watts).

Barium bromate is important as being the salt from which most of the others are prepared. It is best made by adding to a boiling solution of potassium bromate, sufficient anhydrous acetate of barium to saturate it, and allowing to cool slowly. Barium bromate crystallizes out, while potassium acetate remains in solution.

Potassium bromate was prepared by adding bromine to a solution of potassium hydrate, forming the bromide and bromate of potassium, the bromate crystallizing from the solution because of its inferior solubility ("KBr is soluble in 1·6 parts of water, $KBrO_3$ in 16·2 parts."—Walker). The bromide remaining in solution was procured as bromate by adding the requisite quantity (calculated from the molecular weights) of potassium hydrate, and passing a stream of chlorine gas through the solution until saturated, when the bromate separated in small, irregular shaped crystals, the reaction being as follows:

$$KBr+6\ KOH+3\ Cl_2=KBrO_3+6\ KCl+3\ H_2O.$$

The product was purified by recrystallization. The shape of the crystals depends upon the way in which they are made, from hot solution they separate as needles, but by slow cooling are obtained as four and six-sided plates, colorless and anhydrous.

Quinine bromate has been successfully used in some forms of neuralgia, "especially those in which evidence existed of malarious or

rheumatic influence," the large proportion of easily dissociated oxygen present being supposed to add to its physiological activity. These salts were all prepared by double decomposition between barium bromate and the corresponding sulphates, and a sample of each is presented. On platinum or porcelain, heated to redness, they are decomposed with explosive violence, leaving a very slight charred residue. Barium bromate was dissolved in boiling water, a calculated amount of sulphate of quinine added, and the mixture filtered. The filtrate was of a violet blue color, a circumstance I am unable to explain, the suggestion being offered that it may be due to a compound allied to thalleioquin. Almost immediately, the solution being concentrated, crytals began to separate in small clusters. These were redissolved in a large quantity of water, and set aside for a few days, when the product was procured in the form of handsome stellate clusters of long, white acicular crystals. These were dried upon filtering paper. Exposed to the air for nearly a month, they did not effloresce nor undergo any noticeable change. The solubility in water is very slight, as is indicated by the rapidity with which crystals form. The taste is bitter, and the reaction slightly acid. Dropped upon a heated porcelain lid, the crystals decompose immediately with a slight explosion. Upon concentrating the mother liquor the blue color was much deepened, and the second crop of crystals had a violet tinge, which can be removed by solution and crystallization. A repetition of the process in somewhat more dilute solution gave the same results, except that the solution was but very slightly colored at first, but the crystals were no better, and upon concentration the color was again produced.

Cinchonidine bromate was next prepared, the same process being used. This also gave a blue colored solution, but the salt was found to be much more soluble than the preceding, requiring a very concentrated solution before crystals would form. The first that were procured were tested for quinine, but none was found. The easy solubility of the salt, together with the color complication, made the procuring of white crystals a matter of considerable difficulty. By renewed trials with fresh materials, and recrystallizing the products repeatedly, a fairly good specimen was secured. The best plan would probably be to evaporate a moderately dilute solution spontaneously in a cool place or in vacuo. In heating the solution to concentrate it, care must be taken to see that the process be not carried too far, as decomposition is likely to take place and the salt to be spoiled, even if

it does not go off in a sudden explosion. These crystals are not as handsome as those of the quinine bromate; they are white and in clusters, but are much smaller than the others, and the separate crystals are flatter and broader.

Cinchonine bromate.—In preparing this salt the color of the filtrate was observed to be yellow, and remained so, becoming very little deeper, even after much concentration. The salt, while not as difficultly soluble as the quinine, is more so than the cinchonidine salt, but the product has a slight yellow color. The bunches are smaller and differ in shape from the quinine salt, but are larger than the cinchonidine. They give the usual tests for bromates, are bitter, and neutral to test paper.

Quinidine Bromate.—The color of the solution was a delicate shade of pink, but as soon as heat was applied, it began to change and became blue, the color rapidly deepening into almost a black. In a second attempt, the barium solution being saturated, the pink color was again obtained. No heat was applied but after two days the solution was found to have changed to the same blue color. This salt was also very hard to crystallize, on account of its easy solubility, and the difficulty caused by the change in color, but a product was finally obtained that is colorless. The crystals are very much like the others, being needle shaped, and forming in clusters, explosive on hot porcelain, and of a neutral reaction.

If these salts should come into use as remedies, they could be easily prepared by the above process. It is possible that the differences in solubility shown by the bromates could be made useful as a means of distinguishing the alkaloids of cinchona from each other. Lack of time prevented me from looking into this feature of the subject, but it is worthy of further investigation.

FRAUDULENT "HEAVY CALCINED MAGNESIA."

To the Editor of the American Journal of Pharmacy:

Some time ago we were offered by an importing house in a neighboring city what appeared to be a very handsome article of "Heavy Calcined Magnesia," it being represented as such by the seller, with the statement that it was of English manufacture. We analyzed the sample, and thinking an error had been made by the vendors, pro-

cured another sample from them and subjected the same to another analysis, with the following result:

Calcium Sulphate	79·00
Water	20·70
Magnesium Oxide	0·30

Thus showing the so-called "English Heavy Calcined Magnesia" to be nothing more nor less than hydrated Plaster of Paris.

As the article comes upon the market through a reputable house, who have since written us that "they did not offer it as a C. P. article," we feel that the general trade should be warned of the fraud through the medium of your journal, and a warning given against the eternal running after "cheap" drugs, so much in vogue in these days of "cutters," and the placing of such goods in stock without first making the most critical examination. This so-called "Heavy Magnesia" is very handsome, and therefore well calculated to deceive the unwary.

Respectfully, &c.,

KEASBEY & MATTISON.

CHEMICAL NOTES.

Abstracts from Theses.

Liquor Ferri chloridi.—Albert E. Oerter prepared, experimentally, five solutions, following strictly the directions of the pharmacopœia, varying the process in experiment II by leaving the acid and iron in contact for 48 hours, then placing the flask in a sand bath, connecting the flask with a Liebig's condenser and returning the acid distillate into the flask. In each of the experiments 45 grams of iron were used, consisting of card teeth in I and II, reduced iron in III, and iron clippings, sold for preparing solutions of iron, in IV and V. The iron left undissolved was rapidly washed and at once dried, when it weighed, respectively, 4·6, 4·5, 4·5, 4·0 and 5·0 gm. After oxidation the iron solutions were clear with the exception of III from which a substance had to be filtered which was insoluble in water and boiling nitric acid. The specific gravity of each solution was taken and the amount of ferric oxide determined from 10 gm. Three commercial samples of solution of ferric chloride were examined in the same manner, the results being as follows:

Sample.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Spec. grav.	1·386	1·386	1·344	1·411	1·465	1·407	1·328	1·374
Fe_2O_3	1·73	1·73	1·56	1·85	1·84	1·84	1·65	1·70 gm.

Tinctura Ferri chloridi was procured from different stores by Walter Culin, Ph. G. None of the samples gave a reaction for ferrous salt with potassium ferricyanide; eight of the samples gave reactions for nitric acid, and traces of other metals, like zinc, were detected in the same number.

The effect of Sodium chloride upon mercurous chloride was studied by John L. D. Morison, Ph. G., in the following manner: Three beakers were placed in a water-bath for five or six hours at a temperature of 40° C.; each beaker contained a mixture of 2 gm. calomel, 6 gm. sodium chloride and 30 cc. distilled water; to one was added 2 cc. hydrochloric acid, and to another a solution of pepsin acidulated with hydrochloric acid. The light was carefully excluded. On testing the liquids no mercuric chloride was found; but the acidulated pepsin solution contained a small amount of calomel (?), which caused a deposit of mercury upon bright copper foil, and this, on being heated in a tube yielded a sublimate of metallic mercury which, with a fragment of iodine, formed the red iodide.

A mixture of calomel and sodium chloride suspended in milk was next introduced, by means of a rubber tube, directly into the stomach of a dog. After one hour the dog was killed with chloroform; the stomach with contents was digested with ether, the ethereal solution distilled, the residue freed from fat by petroleum benzin, and then exhausted with boiling distilled water; this solution was free from mercury.

Iodides of Mercury.—Robert I. Eads, Ph. G., recommends for the preparation of the red iodide to use the mercuric chloride and potassium iodide in exact molecular proportion, whereby loss is avoided. The color of the green iodide seems to be affected, aside from exposure to light, by the temperature resulting from the combination of the two elements, a darker color with a brown tint being produced on effecting the combination rapidly with the development of heat.

On heating solutions of mercuric nitrate with excess of iodine bright red scales are obtained after cooling. A concentrated solution of mercurous nitrate heated with excess of iodine acicular crystals of a yellowish color with a pink tint were obtained; dissolved in alcohol and the solution evaporated spontaneously, scarlet crystals resulted.[1]

[1] A number of compounds of mercuric nitrate with iodide, varying in color between white and red, have been described by Preuss, Souville and others.—Editor.

Yellow crystals of mercurous iodide were obtained by the process recommended by Stroman (*Berichte*, 1887, p. 2818) by boiling mercurous nitrate with excess of iodine. On washing the crystals with water, they are converted into a red powder.

Salicylate of Cinchonidine was prepared by Sherman L. Carroll, Ph. G., by precipitating cinchonidine from its sulphate, dissolving it in a hydro-alcoholic solution of salicylic acid and evaporating. The solution had a strong tendency to creep over the sides of the dish and the salt had a reddish color. Satisfactory results were obtained on precipitating solutions of cinchonidine hydrochlorate and sodium salicylate, drying the precipitate, dissolving in alcohol, filtering through animal charcoal, and crystallizing.

TINCTURE OF MUSTARD.

By Joseph W. England, Ph. G.

Read at the Pharmaceutical Meeting, February 10th.

Internally as an emetic, and externally as a rubefacient, mustard has held popular pre-eminence, as a safe and efficient remedy, from the earliest period; and it is strange to note that, although it has been used with unvarying success in the directions mentioned, any preparations of it have never, apparently, been employed for internal administration.

It is possible that the disinclination to use preparations internally may have arisen through a belief that any such compounds must necessarily partake of its emetic-producing properties. This idea is an erroneous one. It is now recognized that the emetic qualities of ground mustard seeds are dependent for their exciting cause upon the minute particles enveloping, or having adherent to them, particles of the acrid and volatile principles of mustard, which act, mechanically, as local irritants to the mucous membrane of the stomach, and thus cause a revulsive action, and that it is not due to any centric influence.

Believing, then, that mustard in the form of a tincture would possess valuable stimulating properties, the writer prepared, over a year ago, an alcoholic preparation of this drug and urged its medicinal employment, especially in those conditions which are graphically expressed by the term "drunk-cases." It was found to answer admirably. Possessing the aromatic qualities of ginger and the sharply

stimulating properties of capsicum, it combined in one the excellencies of both, without the local irritant feature so characteristic of capsicum. It was found to be stronger than tincture of ginger and less active than tincture of capsicum; standing, apparently, midway in medicinal activity between the two.

Mustard, as is well known, depends for its medicinal activity upon a fixed, acrid oil—acrinyl sulphocyanide, and sulphate of sinapine, in the case of the white seed, and a volatile liquid—allyl sulphocyanide in the case of the black seed. None of these principles preexist in the seeds as such, but are the results of decomposition by a ferment—myrosin—in the presence of water, of certain proximate principles, sinalbin in the one instance and sinigrin in the other, very much in the same way that amygdalin and emulsin in bitter almonds are broken up when brought in contact with water, to form hydrocyanic acid.

In the preparation of the tincture, the ground commercial black mustard seed which has had the larger portion of its 20–25 per cent. fixed oil removed by pressure, has been used. The formula is as follows:

Take of

Ground black mustard	8 troy-ounces.
Water	2 fluidounces.
Alcohol	q. s. ad 1 qt.

Moisten the mustard with the water, added in small quantities at a time, in a porcelain evaporating dish or other non-metallic receptacle, and admix thoroughly. Cover well and leave stand for 24 hours. Remove and pack in a glass funnel or percolator; add 1 pint of alcohol and macerate for 48 hours. Then allow percolation to proceed, keep adding alcohol until the percolate measures 1 quart.

The finished liquid is a clear, transparent, yellow fluid, having a strong characteristic odor and a warm pungent taste. Mixed with water it becomes slightly opalescent or milky from the precipitation of a small quantity of fixed oil. Its dose is from ¼–½–1 teaspoonful well diluted with water.

Aluminium acetate, in addition to its antiseptic property, has also resolvent powers, and was used by Dr. Grosch (*Berl. Klin. Woch.*, 1888) in the abortive treatment of furuncles, the irrigation being made with a 20 per cent. solution.

PREPARATIONS OF MUSTARD FOR INTERNAL USE.

By J. M. Maisch.

Tincture of mustard prepared as suggested by Mr. England, appears to be a preparation deserving the attention of physicians, and it is probable that its effects may vary somewhat as the white or the black mustard is used in making it, and that the tincture of black mustard cannot be fully represented by a solution of the volatile oil of mustard in alcohol. Liquid preparations of mustard for internal use have been employed until the beginning of the present century; but at the present time their use is very limited. Still formulas for such preparations can be found in modern works, most or all of them based upon such as were in use about a hundred years ago.

The "New London Dispensatory" (edition 1676), after lauding the medicinal effects of *Sinapeos*, states: "Steep'd in Rhenish Wine, and the Wine drank for some Days (lb 1 to a Quart) it helps the Dropsy *Tympanites*, and is very good against Epilepsies, Carus and Lethargy."

The "Pharmacopée universelle," by A. J. L. Jourdan (Paris, 1828), quotes a number of authoritative formulas, from which the following are selected:

VINUM SINAPIOS; COLLUTORIUM SINAPI.

	i.	ii.
Bruised mustard seed	℥ss.	℥i.
White wine	lb. i.	lb. i.
Macerate for six hours and filter.		
Add tincture of cinnamon	—	℥ii.

The first formula is credited to the Wurzburg Pharmacopœia of 1796, and the second to Augustin's "Pharmacopœa extemporanea" (Berlin, 1822). Used as a sialagogue and internally in dropsies.

SERUM LACTIS SINAPINUM, *s.* CUM SINAPI.

Cow's milk	lb. ij.
Bruised mustard seed	℥ij.

Boil together until coagulated, then filter.

This preparation is credited to the pharmacopœias of Holland (1805; Niemann's additions), Hessia (1806), Lippe (1794) and Sardinia (1773). An improved formula recommended by Swediaur (1817) was as follows:

Cow's milk	lb. i.
Mustard seed	℥i.

Triturate together gradually; then add a sufficient quantity of Rhenish wine, coagulate by heat and strain.

Recommended in arthrodynia, gout and paralysis; one or two pounds are to be consumed during the night.

A number of formulas are also given in which beer or ale is used as the vehicle; but these all contain other drugs in addition to mustard.

Formulas similar to, or identical with the above, are also given in Geiger-Mohr's Pharmacopœa universalis; but as indicated by the types used for them, these preparations were at that time but rarely employed. Yet in a work as recent as Bernatzik and Vogl's "Arzneimittellehre" (Vienna, 1886) it is stated that mustard is occasionally, though rarely, used as a diuretic in the form of *serum lactis sinapisatum*, prepared from ground mustard 50 gm. and milk 1 liter.

Dorvault, in "L'Officine," quotes only a few of the old formulas which appear to be rarely, if ever, employed in France. But Hager, in "Pharmac. Praxis," gives in addition to various others a formula for

SYRUPUS SINAPIS.

Simple syrup	100 parts.
Spirit of mustard	1 part.

Dose, a tablespoonful, in bronchial catarrh.

Spiritus Sinapis of the German Pharmacopœia is a solution of one part of volatile oil of mustard in 49 parts of alcohol.

Aqua Sinapis, which was formerly prepared by macerating black mustard in water and distilling, is recommended by Hager to be made by dissolving one drop of the volatile oil of mustard in 250 gm. of distilled water.

PHARMACEUTICAL NOTES.

Abstracts from Theses.

Fluid Extract of Apocynum.—Jas. Webb Beckwith, Ph. G., experimented with different menstruums and ascertained that one composed of three parts of alcohol, and one of water, and containing 10 per cent. of glycerin yielded the best results. Operating upon 200 grams of the powdered drug, the reserved portion measuring 170 cc., was perfectly clear; after evaporating the weak percolate to the consistence of a soft extract, dissolving this in sufficient of the menstruum,

and adding to the reserved portion, a flocculent matter was separated rising to the surface and leaving the liquid clear.

On percolating the drug with the same mixture of alcohol and water, omitting the glycerin, the percolates were nearly clear until the evaporated portion was added to the reserved liquid, when it became turbid. A mixture of two parts of alcohol and one of water yielded a percolate from which a precipitate separated, which was increased on the addition of the evaporated portion. The percolate of the drug obtained with diluted alcohol was cloudy and deposited a precipitate.

Syrupus Rhei aromaticus.—John H. Bear, Ph. G., proposes the addition of a little borax whereby a clear and apparently unobjectionable preparation is obtained. For one ounce avoirdupois of the aromatic tincture of rhubarb 18 grains of borax are used.

Bases for Unguentum Iodi.—Charles W. Cannon, Ph. G., has experimented with lard, lanolin and petrolatum as the base for iodine ointment; and after keeping the ointments under various conditions in the dark, or exposed to diffused daylight or to sunlight determined the amount of iodine by dissolving it in alcohol and estimating it with volumetric solution of sodium hyposulphite. Lanolin and lard yielded the iodine to the solvent quite readily, while petrolatum persistently retained a portion of it. The largest amount of iodine was invariably recovered from the lanolin, and this is recommended as the best base for iodine ointment; the well known qualities of lanolin furnish additional reasons for its use in this connection.

Unguentum Aquæ Rosæ.—William Stengelin, Ph. G., furnishes the following formula, which is stated to yield an excellent preparation:

Expressed oil of almond	4 ounces.
White wax	1 ounce.
Spermaceti	6 drachms.
Distilled water	1½ ounces.
Oil of bergamot	5 drops.
Otto of rose	5 drops.

In order to obtain it of a light, frothy consistence it is recommended to beat it with a wooden stirrer having a perforated blade, which should be dexterously worked, and is afterward readily cleaned.

Fluid extract of viburnum, in doses of ʒi, has been given in Bellevue and other hospitals against vomiting of pregnancy, with uniformly successful results.

NOTE ON THE MOLYBDATE TEST FOR HYPOPHOSPHITES.[1]

By E. J. Millard, Pharmaceutical Chemist.

In several text-books of pharmaceutical chemistry, and also in the National Dispensatory by Stillé and Maisch, ammonic molybdate is stated to give a blue precipitate with hypophosphorous acid and the hypophosphites. No details of the reaction are given, although it is recommended as a test.

As far as I have been able to ascertain, the test is founded on the observations of Winkler,[2] at least he is the earliest authority on the subject, for in 1850 he mentions that hypophosphites are colored blue by molybdate of ammonium, and that a mixture of phosphate with hypophosphite yields a green coloration, owing to the combination of yellow phosphomolybdate with the blue.

Now, in common with many others, I have never been able to get a blue precipitate, when solutions of the two bodies are mixed, and only a faint coloration appears after standing some considerable time, nor does the fact of the solution of the molybdate being acid, neutral or alkaline, make any difference in this result.

Whilst experimenting with solutions of ammonic molybdate and hypophosphites, I noticed that the addition of a small quantity of sulphurous acid rendered the inoperative test a most delicate one. Moreover, the ordinary nitric acid solution of molybdate of ammonium, used as a test for phosphoric acid, answers even better than a neutral or alkaline solution. For, if to a solution of hypophosphorous acid or any of the hypophosphites the acid solution of ammonic molybdate be added, and then a few drops of sulphurous acid, a blue precipitate is immediately formed, or if the solution be dilute, a blue colorationis produced which is considerably intensified by agitation or gentle warming.

Phosphoric acid and the phosphates, phosphorous acid and the phosphites similarly treated do not react, neither do pyrophosphates.

The reaction is, I believe, due to the partial reduction of MoO_3 to Mo_3O_8 by the hypophosphorous acid, which is completed by the sulphurous acid. This blue oxide has been shown by Pfordten[3] to exist between colorless MoO_3 and brownish MoO_2.

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[1] Reprint from the Pharmaceutical Journal, Jan. 26, 1889; communicated by the author.

[2] Poggendorff's "Annalen d. Physik u. Chemie," Band cxi., p. 443.

[3] *Journ. Chem. Soc.*, Abstracts, 1884, page 559.

It may be thought that any reducing agent, as SH_2 or $SnCl_2$, would answer equally well, and perhaps reduce the molybdate without the presence of hypophosphorous acid being necessary. These reagents, however, carry the reduction too far, namely, to the brown state.

Alkaloids, including morphine, and most salts, with the exception of chlorates, sulphides and thiosulphates, do not affect the reaction.

Chlorates prevent the reaction, sulphides produce a brown-black coloration that would completely hide it, and thiosulphates reduce the molybdate to the brown state. Each of these, however, if treated by boiling well with dilute acid, preferably hydrochloric, cooling and then adding the reagents, will react properly. Excess of alkali prevents the coloration showing until acidified; strong mineral acids spoil the reaction, but dilute acids fail to interfere. Boiling causes the precipitate and color to disappear, but if cooled again and more sulphurous acid added the color reappears.

In pure solutions the reaction is very delicate, it being possible on gently warming to detect 1 part of H_3PO_2 in 2000, whilst the well-known cupric reaction fails completely.

In mixtures and in the presence of acids, etc., about 1 in 300 is the limit. It forms a splendid lecture experiment, as the color is very fine and deep.

I may add that ammonic tungstate reacts in exactly the same manner as the molybdate does.

GLEANINGS FROM THE GERMAN JOURNALS.

By F. X. Mœrk, Ph. G.

Boroglycerides.—E. Hirschsohn has studied the products obtainable by using various molecular ratios, and finds the following to give most satisfactory results: *Boroglyceride,* distinguishable by its solubility in two parts 95 per cent. alcohol and in twelve parts water, is made by heating on a sand-bath 62 parts boric acid (1 mol.) and 95 parts glycerin (1 mol.) until a portion removed becomes solid on cooling. *Sodium boroglyceride,* 38 parts powdered borax (1 mol.) and 38 parts glycerin (4 mol.) gave a pale yellow vitreous mass, completely soluble in two parts alcohol and also in two parts water. *Calcium boroglyceride,* made, owing to the variable nature of commercial calcium borate, by taking freshly slaked lime 7·4 parts (1 mol.) and boric acid 24·8 parts (4 mol.), mixing intimately and heating with 76 parts gly-

cerin (8 mol.); solubility same as Na compound. *Magnesium boroglyceride* made in the same manner as the preceding, magnesia 4 parts (1 mol.), boric acid 24·8 parts (4 mol.), glycerin 76 parts (8 mol.). This compound, very soluble in alcohol and water, appears under the name of "Antifungin," as an aqueous solution of some merit in throat affections.

The use of more glycerin in these preparations yields hygroscopic products, more boric acid or borate, less soluble products. If the metallic compounds be treated with ether or acetic ether, they are decomposed into boric acid, soluble in the menstruum, and a compound of the base with glycerin which is insoluble in the ethers, but afterwards is readily soluble in water, the solution possessing an alkaline reaction.—*Pharm. Ztschr. f. Russl.*, 1889, 1, 17.

Alkaloidal Tests.—Acetate of *brucine* in dilute solution with lead dioxide gives after a short time a red coloration; acetate and oxalate of *apomorphine* in dilute solutions on addition of lead dioxide or hydrated manganese dioxide, a cherry-red color.—*Chemiker Ztg.*, 1889, 95.

Electrode indicator, a test paper to indicate the negative pole of an electrical machine can be made by impregnating turmeric or red litmus paper with sodium chloride; its use depends upon the separation of metallic sodium, which rapidly in presence of water forms sodium hydrate; if the moistened paper is touched by the negative pole a brown or blue spot, according to the paper used, at once appears. A commercial indicator consists of blotting paper saturated with sodium sulphate and phenolphtalein, which is turned red by the negative pole.—*Pharm. Centralh.*, 1889, 16.

Pyrodine and Acetphenylhydrazid.—According to investigations of Prof. Dreschfeld the latter if pure is four times as active as the former, the dose being, for adults, 0·12–0·18 gm. (2 to 3 grains). These two substances, hence, are not, as generally believed, identical; pyrodine being a crude product containing acetphenylhydrazid.—(*Therap. Monatsh.*) *Pharm. Ztg.*, 1889, 15.

Iodoform.—B. Fischer in studying the action of solvents upon this body finds that, if *pure iodoform* be dissolved in solvents free from dissolved air and without access of air, the solution will keep of a light yellow color so long as air be excluded; if air be admitted decomposition takes place in a few minutes attended by liberation of iodine. The presence of certain substances retards this decomposition; these

substances (impurities) may be present in the solvents from which iodoform is recrystallized, thus contaminating the crystals, or they may be present in the solvents; such substances as retard the change, if present in minute quantity, are hydroquinone, pyrogallic acid, aniline, pyridine bases and aldehyde.—*Pharm. Ztg.*, 1889, 31.

Fluorescence.—E. Geissler examined a yellow powder used for destroying the fluorescence of petroleum oils in the proportion of 0·2–0·3 gm. for 100 cc. oil; it proved to be *nitro-naphthalin.* Nitrobenzol also possesses this property although not to such a marked degree. The interesting observation was made that the fluorescence of quinine salts was destroyed by a little of these chemicals. If light be made to traverse solutions of these substances it will not produce the fluorescent effect either upon quinine solutions or petroleum oils; this is explainable by the possible absorption of the blue rays by nitro-benzol and nitro-naphthalin.—*Pharm. Centralh.*, 1889, 11.

Russian turpentine from Pinus sylvestris contains about thirty per cent. of a crystalline acid $C_{40}H_{58}O_5$ obtainable by extracting the turpentine with 50–60 per cent. alcohol and treating the granular residue with boiling alcohol, which solution solidifies to a crystalline mass on cooling. The acid is insoluble in water, soluble in alcohol, glacial acetic acid, ether and carbon disulphide; it melts at 143°, boils at 360°, and is converted by HCl into a modification melting at 159°–160°.—W. Schkatelow, *Apoth. Ztg.*, 1889, 99.

Hyponitrous oxide or nitrogen monoxide can be obtained perfectly pure by heating 5 parts crystallized stannous chloride, 10 parts hydrochloric acid sp. gr. 1·21, 0·9 parts nitric acid sp. gr. 1·38, until the mixture boils, when a steady evolution takes place according to the reaction:

$$2\,HNO_3+4\,SnCl_2+8\,HCl=4\,SnCl_4+N_2O+5\,H_2O.$$

The above proportions must be strictly adhered to.—G. Campani, *Chem. Rpt.*, 1889, 5.

Cobalt and Nickel.—Krüss and Schmidt in redetermining the atomic weights of these metals by precipitating a neutral solution of auric chloride by means of metallic cobalt and nickel, obtained quite variable results, due to supposed admixture of Co and Ni with the precipitated gold. To control this error the gold precipitate was dissolved and reprecipitated by addition of sulphurous acid; even now the results were still discordant. In washing the gold precipitate the color of the washings disappeared and then became finally greenish;

this portion was collected separately and after evaporation and ignition a white oxide was obtained which, on examination, proved to be that of a new element. From 50 gm. oxide of nickel 1 gm. of this white oxide was obtained. The reactions of this new element are: white oxide soluble in HCl, which solution on warming is green colored, on cooling again becomes colorless; hydrate insoluble in excess of the alkaline hydrates, but dissolved by fused KOH or Na OH; black sulphide in alkaline solution, insoluble in ammonium sulphide; oxide non-reducible by H at high temperatures; chloride is colorless, but traces of HCl gas cause a green color which disappears when dissolved in water; chloride forms with red cobaltous chloride a double salt of green color.—*Ber. d. d. Chem. Ges.*, 1889, 11.

Areca-nut contains three alkaloids, *arecoline* 0·07–0·1%, *arecaine* 0·1%, and the third one in such small quantity that it has not been possible to examine it. Arecoline, $C_8H_{13}NO_2$, identical with Bombelon's *arecan*, is an alkaline, colorless, oily liquid, soluble in water, alcohol, ether and chloroform; it is poisonous and probably gives the drug its tænifuge properties. Arecaine $C_7H_{11}NO_2+H_2O$ forms permanent colorless crystals soluble in water, insoluble in absolute alcohol, ether, chloroform, benzol, and appears to be inactive.—E. Jahns, *Ber. d. d. Chem. Ges.*, 1888, 3404.

Amyl alcohol of commerce is always contaminated with *furfurol* and resinous matter, and is unfit for extraction purposes. To purify it, it is heated in a steam-bath with an equal volume of sulphuric acid for eight hours, the color changing to a black-brown; the alcohol is separated, neutralized with chalk and distilled in a current of steam. By repeating this process four or five times an almost pure amyl alcohol is obtained; perfectly pure (free from even traces of furfurol) it can only be obtained by decomposing potassium amyl-sulphate with sulphuric acid after first purifying the commercial salt by solution in alcohol and precipitation by a large excess of ether. Thus prepared amyl alcohol may be boiled for hours with concentrated sulphuric acid without assuming color.—L. Von Udranzky, *Ztschr. f. physiol. Chem.*, xiii, 248.

Test for arsenic.—Flückiger in *Arch. der Pharm.*, 1889, p. 1, critically examines Gutzeit's test and finds that it is decidedly more delicate than Marsh's test. The reaction is best carried out by generating hydrogen from dilute hydrochloric acid and zinc and allowing the gas after the addition of the arsenic solution to act upon filter paper moistened with

silver nitrate which is placed over the generator; the yellow coloration formed is due to $Ag_3 As$ $3Ag NO_3$; this test will allow of the detection of 0·001 mg. $As_2 O_3$. Not quite so delicate but a more convenient test is gotten by using mercuric chloride to moisten the filter paper, a yellow stain is also produced, but its nature is not established; 0·002 mg. As_2O_3 will be indicated by this modification which has two important advantages: first, $AgNO_3$ is affected by light, $HgCl_2$ is not affected to any marked degree; second, $H_3 Sb$ does not stain $HgCl_2$ while it does stain $Ag NO_3$. In alkaline solutions, by use of sodium amalgam, not less than 0·01 mg. As_2O_3 can be detected; metallic aluminum with an alkali did not give good results as it contains either S, As or P, which interfere. Other metals in acid solution were tried but none were found superior to zinc. To test the zinc, 10gm. are acted upon by dilute HCl, the evolved gas should produce no yellow stain with $Ag NO_3$ or $Hg Cl_2$ in two hours, the test to be made in a dark place. The manufacturers of zinc are asked to produce a metal absolutely free from As, Sb, S and P.

Acetanilid in Phenacetin to the extent of two per cent. may be proven by boiling 0·5 gm. in 5-8 cc. water, allowing to cool, filtering, adding to the filtrate dilute nitric acid and a little potassium nitrite, boiling, adding several drops nitroso-nitric acid and again boiling; a distinct red color appears in presence of acetanilid.—Schrœder (*Ned. Tydschr. Pharm.*) *Pharm. Ztg.*, 1889, 57.

Assay of narcotic extracts.—The method of L. van Itallie requires the following solutions: Lead acetate, 1:10; dilute sulphuric acid, 5:100; chloroform; ether; $\frac{1}{100}$ normal acid; and as indicators cochineal tincture or an alcoholic solution of azotlinin or lacmoid. For the examination of *aconite, belladonna* and *hyoscyamus extracts*, the procedure is to take 5 gm. extract which is rubbed up with ten drops dilute sulphuric acid and sufficient water to make 50 cc., allowed to macerate one or two hours, and 25 cc. of the lead acetate solution added. After the subsidence of the precipitate, 50 cc. are filtered off through a dry filter, 10 cc. dilute sulphuric acid added, 50 cc. filtered into a separating funnel, sufficient ammonia added to give alkaline reaction and the alkaloid extracted by use of three portions of chloroform of 50 cc. each. The mixed chloroform extractions are distilled to dryness, the residue taken up in 5 cc. dilute alcohol and, after adding indicator, titrated with $\frac{1}{100}$ normal acid. The acid added represents the alkaloid in $2\frac{7}{9}$ gm. extract. For *conium extract* the

solution is rendered alkaline by use of potassium hydrate (1:2) and for extraction of alkaloid ether is used in place of chloroform; before the distillation of the ether 2 cc. water should be added. 1 cc. $\frac{1}{100}$ normal acid is the equivalent of 2·89 mg. atropine and hyoscyamine, 5·33 mg. aconitine and 1·27 mg. conine; to obtain the per cent. of alkaloid directly from the number of cc. acid used, the following factors are calculated: atropine and hyoscyamine, 0·10404; aconitine, 0·1919; conine, 0·04572.

Control experiments with atropine recovered 98·62 and 99·71 per cent.—(*Ned. Tydschr. Pharm.*) *Apoth. Ztg.*, 1889, 124.

Codeine used considerably in medicine of late is made synthetically by R. Dott by passing methyl chloride through a hydro-alcoholic solution of morphine and sodium hydrate; the alcohol is evaporated, the residue taken up in water and the codeine extracted with chloroform. A. Knoll (*Pharm. Centralh.*, 1889, 39) introduces the methyl group into the formula of morphine by reacting upon the latter body with a salt of methyl-sulphuric acid. The product is dissolved in dilute sulphuric acid, the unchanged morphine precipitated from rather dilute solution by ammonia and from the filtrate the codeine is extracted by ether, benzol or chloroform. The alkaloid so gotten is pure and forms colorless rhombic prisms, melting at 155°, soluble in 17 parts hot and 85 parts cold water. For subcutaneous uses the phosphate is the best salt, being soluble in 4 parts water.

ABSTRACTS FROM THE FRENCH JOURNALS.

Translated for the AMERICAN JOURNAL OF PHARMACY.

PHENOLATE OF MERCURY.—On account of the variations observed in the preparation of this salt now in the market, M. Hugo Andres proposes the following method "by which pharmacists will always be able to obtain a definite product." First, prepare a phenolate of potassium by dissolving in alcohol of 90 per cent., 94 parts of crystallized phenol and 56 parts of hydrated potash. Evaporate to a syrupy consistency in the water-bath, and place under a bell-glass with sulphuric acid until desiccation is effected. Then dissolve 100 parts of phenate of potassium in alcohol, filter, and precipitate the filtrate with an alcoholic solution of 112 parts of corrosive sublimate. The proportions are calculated as follows:

$$C^{12} H^5 KO^2 + Hg Cl = (C^{12} H^5 O^2) Hg + K Cl.$$

We thus obtain an orange precipitate, which should first be washed with alcohol of 60 per cent., and then with absolute alcohol until the filtrate gives no precipitate with sulphuretted hydrogen. The dried product is an amorphous powder of a brick red color with a faint odor of phenol. It is insoluble in water, chloroform, sulphide of carbon, ether and alcohol. With heat it dissolves easily in hydrochloric acid; with potash, the solution gives a precipitate of yellow oxide of mercury. It is also dissolved by nitric acid. The preparation contains 51·68 per cent. of mercury; theoretically it should have 51·81 per cent.—*J. de Ph. et de Ch.*; *Bull. com.*, January, 1889.

CAMPHORATED PHENOLS.—M. Désesquelle pointed out some time since (AMERICAN JOURNAL OF PHARMACY, 1888, p. 510) the liquefying influence of camphor upon naphthol. M. Audoucet has been testing the power of camphor over other phenols, and gives the results as follows: (The quantities of camphor cited represent the amounts strictly necessary to reduce the preparations to the condition of a soft paste); *Resorcin*, 2·50 gm.; camphor, 5 cgm.; *Pyrogallol*, 2·50 gm.; camphor, 10 cgm.; *Thymol*, 5 gm.; camphor, 1 gm.; *Salol*, 5 gm.; camphor, 50 cgm. An increased amount of camphor gives syrupy liquids miscible in all proportions with oils, lard and petrolatum, and which are soluble in alcohol and ether, and insoluble in water. Similar results were obtained with menthol.—*Répert. de Phar.*, January 10, 1889.

PYRODINE.—The proper doses of this antipyretic, said to be useful in pneumonia, scarlatina, typhoid fever, migraine and the neuralgias, are given by the *Bull. méd.* as follows: For children, the quantity to be given daily should be from 10 to 20 cgm.; for adults, 40 to 60 cgm. It should not be given oftener than every 18 or 24 hours. Administered repeatedly at short intervals it gives rise to toxic symptoms. It is said to be a powerful antiseptic as well as an antipyretic. Dr. Lepine proposes to call it phenacethydrazine, as, under its present name, it is likely to be confounded with pyridine.—*Répert. de Phar.*, January 10, 1889.

KAVAÏNE, ALKALOID OF KAVA-KAVA.—M. Lavialle (a pharmacist of Crest, France) writes to the *Union Phar.*, Jan., 1889, that he has separated from kava an alkaloid which he has named kavaïne. He exhausted pulverized kava root with alcohol of 60 per cent., and distilled to the density of a fluid extract. He added distilled water to precipitate the resin, filtered the liquor, and neutralized it with ammo-

nia. He then agitated it with ether, adding sulphuric acid, drop by drop, until he obtained a slightly acid reaction. The liquor, on standing 24 hours, deposited crystals which were washed several times with 95 per cent. alcohol. The sulphate of kavaine is soluble in an equal part of water at 15° [59° F.], sparingly soluble in alcohol, and insoluble in ether. It appears in prismatic crystals which deliquesce slightly on exposure to the air.

COCAINE AND LANOLIN FOR BURNS.—Dr. Wende recommends a preparation made of these substances. It excludes the air and quiets the pain. The cocaine should be pure and the mixture freshly prepared.—*J. de Méd. de Paris.*

IODIDE OF POTASSIUM AND SYRUP OF TOLU.—M. Leprince finds that the yellow tint sometimes obtained in mixtures of these substances is caused by the more or less constant presence of carbonate of potassium in the commercial iodide; the carbonate acts upon the resins contained in the tolu, and also, though less strongly upon cinnamein, one of the ethers present.—*Répert. de Phar.*, Jan. 10, 1889.

THE DIURETIC PRINCIPLE OF STROPHANTHUS.—After having separated strophanthin from the seeds, M. Catillon isolated a non-toxic, nitrogenous principle which, tried first upon rabbits and then upon himself, he found to be the diuretic principle of the plant. To obtain it, the author, first exhausting the seeds with alcohol, treats them with distilled water, afterward adding milk of lime, and filtering. A current of carbonic acid is then passed through the filtered liquid, which combines with the excess of lime. The liquid is then evaporated to a syrup, again filtered, and then evaporated in vacuo. The product is soluble in water and in alcohol at 70°; less soluble in stronger alcohol. The product is a sort of strophantate of lime, which gives a precipitate with hydrochloric acid.—*Soc. de Thérap.*, Dec. 26; *Répert. de Phar.*, Jan. 10, 1889.

MORRHUIC ACID.—M. M. Gautier and Mourgues find in cod-liver oil an acid, relatively abundant, having "the double function of an acid and an alkali." It is found, like the ordinary lecithins, in unstable and complex combinations, *i. e.*, it changes with acids or alkalies, setting free glycerin and phosphoric acid. It separates slowly and continuously from alcoholic or aqueous acidulated extracts of cod-liver oil, even when brought together cold. Morrhuic acid, recently precipitated, is oleaginous and viscous, but may be crystallized in square, flat prisms, or in lanceolate forms. It dissolves in hot water,

and precipitates on cooling. It is soluble in alcohol; sparingly so in ether. It reddens litmus, decomposes the carbonates, unites with alkalies, and gives salts which precipitate the acetates of lead and the nitrate of silver, but not the acetate of copper, even with heat. It combines with acids and with bases. On submitting it to distillation with alkalies, and to oxidation, we became assured that it belongs to the pyridine series. Its formula is $C^9H^{13}NO^3$, thus differing from tyrosin only by having 2H more. To separate morrhuic acid, it is only necessary to exhaust the oils methodically with alcohol at 35° C. (95° F.), acidulated with 5 per cent. of hydrochloric acid. The alcoholic liquors are saturated with carbonate of potash and distilled in vacuo at 45° C. (113° F.). The residuum is again acidulated, carried for an instant to 100°C. (212° F.), and again taken up by alcohol at 85° C. (185° F.). Evaporation leaves the thick, viscous oil which constitutes morrhuic acid.—*Comptes rendus; L' Union Phar.*, Dec., 1888.

THE AMERICAN TINCTURA QUILLAJÆ.[1]

By J. Rutherford Hill.

On looking over the "National Formulary of Unofficinal Preparations," issued by the American Pharmaceutical Association, I was struck by the process given for the preparation of tinctura quillajæ, which is as follows:

Quillaja, in fine chips	8 troy ounces.
Alcohol	1 pint.
Water	enough to make 3 pints.

Place the quillaja in a suitable vessel, with *two* (2) *pints* of water, and boil for fifteen minutes, then strain and add enough water through the strainer to make the strained decoction, when cold, measure *two* (2) *pints*. Pour this into a bottle containing the alcohol, let the mixture stand twelve hours, then filter it through paper, and add enough water to the filtrate to make it measure *three* (3) *pints*.

A footnote states that each fluid drachm represents 10 grains of quillaia. This seems to imply that the process is practically perfect and that the drug is completely exhausted.

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[1] Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in Edinburgh, Thursday, January 30; reprinted from *Phar. Jour. and Trans.*, Feb. 9, p. 626.

In view of the criticism on tinctura quillaiæ, B.P.C., communicated to an Evening Meeting of the Society last year by Mr. Boa, and from my own experience with the drug, it seemed to me that the above formula was objectionable and unscientific, on account of the liability of saponin to split up into sapogenin and glucose under the influence of heat. It also appeared to me that the method of pouring water over the marc on a strainer was somewhat rough and not calculated to ensure complete exhaustion. I have found, moreover, that quillaia can be completely exhausted by maceration and percolation with cold water, and it occurred to me that this might be substituted with advantage for the boiling and straining ordered in the first stage of the American process.

A sufficient quantity of quillaia bark (free from outer brown layer) was reduced to fine chips and mixed. From this two tinctures were made, as follows;—

A.—The quillaia, in fine chips, was packed in a percolator, macerated for twenty hours with one-third of the water, and percolated with the remainder of the water. The percolate was a pale golden yellow liquid. This was mixed with the alcohol, when it became slightly opalescent. After standing twelve hours a flocculent precipitate had settled down, leaving a transparent pale yellow liquid with a few flakes floating through it. This passed rapidly through the filter and was made up to the requisite measure with water.

B.—This tincture was made by the American process. The bark absorbs most of the water and there is apparently not much to boil with. It also froths up during the boiling and the operation must be conducted in a capacious vessel. The strained liquid, unlike the cold percolate of the previous process, was of a brownish-yellow color and very cloudy or opalescent. This cloudiness is due, I think, to incipient decomposition and separation of insoluble sapogenin. The strained liquid was mixed with alcohol, and after standing twelve hours a precipitate had settled out, but the supernatant liquid was not transparent but only translucent. The fine floating precipitate causing this slight opacity appeared to clog the filter, and consequently the filtration of the tincture was extremely slow and tedious. The marc from each tincture was percolated with a further quantity of water and the percolate reserved. For preparing the tinctures and for the practical notes thereon I am indebted to my friend, Mr. C. A. Macpherson.

The tinctures and percolates were examined, with the following results:—

	Extractive per cent.	Sapogenin per cent.	Glucose per cent.	Saponin per cent.
A	4·28	0·74	1·6	2·63
B	4·02	0·67	1·4	2·30
C	0.14	Trace.	Trace.	—
D	0·23	0·06	Distinct trace.	0·20

C and D are the water percolates from the marcs of A and B respectively. These results indicate that the most satisfactory tincture is obtained, and that the drug is most efficiently exhausted by cold maceration and percolation.

A tincture of quillaja is frequently used in Edinburgh for hairwashes, and I find a general impression prevails to the effect that by using heat a stronger and more syrupy tincture is obtained, which froths more readily and is a better emulsifying agent. The foregoing results do not tend to support such an impression. Possibly the small quantity of glucose in the tincture made by heat may give a certain tenacity to the liquid, which tends to preserve the froth longer; but a few experiments made with A and B, both as to frothing and emulsifying, indicate little or no difference, and if there is any difference it is in favor of the cold-made tincture. In any case boiling should be avoided, and if heat is to be used at all, it should only be in the form of infusion.

It will also be seen from the above table that the quillaia is practically exhausted by the cold process, whereas exhaustion is less complete by the comparatively rough method of washing the marc on the strainer, as ordered in the American process.

The decomposition of the saponin does not come out fully in the above table, because, though the change has taken place, the quantity of alcohol is sufficient to keep in solution the sapogenin formed. That such a change has taken place, however, is indicated by means of Fehling's solution. If a little of the American tincture is warmed with Fehling's solution reduction takes place immediately. With the cold-made tincture, under similar circumstances reduction does not take place until it has been boiled for a time.

Another feature in the American formula which seems unnecessary is the intermediate stage of mixing the watery decoction with alcohol, allowing to stand twelve hours and filtering. There does not appear to be any advantage in dissolving out mucilaginous matter with water

and then precipitating it with alcohol. It would be an advantage to avoid this stage altogether, and this could be done by simplifying the formula, as follows:—

Quillaja bark, in fine chips	8 troy ounces.
Alcohol	1 pint.
Water	enough to make 3 pints.

Mix the alcohol and water; pack the bark in a percolator; moisten with 1 pint of menstruum; allow to stand twelve hours and then percolate with the remainder, adding water until the percolate measures 3 pints. Filter if necessary.

Mr. Boa, in the paper to which I have referred, showed that such a process is efficient, and that quillaja bark can be completely exhausted by percolation with proof spirit. The American menstruum is deficient in alcohol, as is shown by the tinctures now exhibited, which are beginning to throw down a deposit. Mr. Boa also showed that a menstruum containing less alcohol than the proof spirit of the British Pharmacopœia gave a tincture which deposited on standing. I would therefore suggest that the menstruum in the American formula should be increased in alcoholic strength to 49 per cent. by weight.

With regard to the degree of disintegration of the bark I think the American standard of fine chips is much better than the No. 20 powder of the B.P.C. formula. Quillaia bark is exceedingly difficult to reduce to fine powder, both on account of its toughness and its very irritating effect on the nasal mucous membrane, as all those can testify who have had to deal with it. So fine a state of division is, moreover, quite unnecessary, and never, so far as I have seen, adopted in practice. I would therefore suggest that the formula of the B.P.C. unofficial formulaly should be altered in this respect, and fine chips substituted for No. 20 powder. As an ordinary emulsifying and therapeutic agent it would also, I think, be an advantage to have in the B.P.C. formulary a tincture made with dilute alcohol, in addition to the present tincture made with rectified spirit, which is required only for a special purpose.

Effect of coffee on the Urine.—Dr. Dumont's observations prove that after the use of coffee the amount of urea contained in the urine is increased, and that it decreases again to the previous amount as soon as the coffee is omitted.—*Lancet.*

QUILLAJIC ACID.[1]

By R. Kobert.

The saponin of commerce, as all other specimens of saponin, is an almost inactive, non-poisonous modification of quillajic acid. The author precipitated the acid from the aqueous extract of the bark of *Quillaja Saponaria* with neutral lead acetate; the precipitate was freed from lead, the solution of the acid evaporated almost to dryness, and then taken up with hot absolute alcohol. The coloring matter was precipitated with chloroform; the quillajic acid eventually crystallized out in pure white flakes. It is insoluble in ether, soluble in water and alcohol. On treatment with concentrated sulphuric acid, it becomes dark red. By boiling with dilute mineral acids, it is split up into an unfermentable glucose and sapogenin; this solution reduces Fehling's solution. Quillajic acid has the formula $C_{19}H_{30}O_{10}$. The sodium salt acts as a very severe caustic on the tongue and throat, and the smallest particles coming in contact with the nose or throat cause violent sneezing and coughing. Brought on to the eye, it causes severe pain, flow of tears, and swelling of the lids. Injected into the blood, sodium salt proves fatal, causing cramp and paralysis of the respiratory organs and brain. On the other hand, it may be imbibed into the stomach without injury to the extent of 500 times the quantity which proves fatal when injected into the blood.

Sick Headache Powder.—A preparation is offered under this name and recommended for sick headache. Its apparent efficiency suggested an investigation into its proximate composition. A few qualitative experiments resulted in reactions showing the presence of milk sugar and sodium salicylate. The moisture amounted to 1 per cent., the ash consisting of Na_2CO_3 weighed $1\frac{1}{2}$ per cent. Each powder is put up in waxed paper containing 30 grains of the cream colored or white powder, which consists of equal parts of milk sugar and sodium salicylate.

A powder similar in appearance was prepared in accordance with these results, and was found to produce the same effect.

Robert Glenk.

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[1] From *Jour. Chem. Soc.*, 1889, p. 55; *Arch. exp. Path. Phar.*, xxiii. 233.

CULTIVATION OF SESAMUM AND GROUND-NUTS IN CHINA.

Sesamum is best grown on high dry ground, and is most in danger from excess of moisture; it does not require watering, and dew alone is sufficient moisture to nourish it. In making beds, therefore, the centres should be higher than the sides, so as to allow the water to run off. In the first month of every year it is sown broadcast, not in lines, and whether thickly or sparsely is immaterial. In about ten days it puts forth shoots, in two months and a half it is fit for harvesting. At harvest time the latest seeds are not yet ripe, but the harvest cannot wait, or the other pods would fall off, and the seeds drop out on the ground. The plants, root and all, are carefully taken out of the ground, put on a cement floor, and threshed with a flail. There are two kinds, black and white. Sesamum does not require manure generally, but in the worst soil ashes and ox manure may be used. About 27 ounces sown to an acre yield about 550 lbs.

Ground-nuts are best grown in a soil of coarse sand and mud. They should be set deep, and the ground pressed down firmly over them. The ground is ploughed about April, and trenches dug about 10 inches apart, into which ashes, lime, and rubbish are thrown. The seeds are sown 10 inches apart, and as each is put in the sides of the trench are turned over it with the foot and stamped down firm. Every ten days or so the ground is weeded, and in about two months the sprouts are sufficiently long, and are sprinkled with liquid manure. In four months they come into flower; the flower-stalk then bends over, and, as the flower falls off, the flower-stalk buries itself in the ground, and produces seeds, ground-nuts, which become ripe about the Shuangchiang festival (October 23). When the harvest, however, takes place after this date more oil can be got, and a better price obtained for it. Ground-nuts are harvested by ploughing them up with an ox-plough, when the stalks and seeds clinging to the plough are gathered into a heap. For the remainder which are still left in the ground two men sift the earth with a large bamboo sieve. The pods are dried perfectly dry in the sun, until the thin skin which covers the seed can be broken by rubbing, when they can be stored. If they are not quite dry they shoot again, and are useless. Oil is pressed from ground-nuts, and the refuse made into ground-nut cakes; 40 lbs. sown to an acre yield about 666 lbs.—*Phar. Jour. and Trans.*, Dec. 22, 1888, p. 492.

ASPIDIUM FILIX MAS, L.[1]

By G. Daccomo.

If the ether extract residue of the rootstock of aspidium (male fern) is treated with two volumes of 95 per cent. alcohol and one volume of ether, a brown residue is left which is partially soluble in one per cent. aqueous potash. The soluble portion is the filicin or filicic acid of Trommsdorff; the insoluble part separates from an alcoholic solution as a white, floccular, waxy substance, $(C_{13}H_{26}O)_n$, melting at 80°, it is insoluble in water, sparingly soluble in ether and cold alcohol, but soluble in hot alcohol; it is not decomposed by boiling alcoholic potash, and gives no coloration with sulphuric acid and chloroform.

The residue obtained by evaporating the alcohol-ether solution of the original extract, when extracted with water, furnishes glucose and tannin, and with 95 per cent. alcohol a black resin which is almost completely soluble in 2 per cent. aqueous potash. The residue of the extract, insoluble both in water and alcohol, is a green oil difficult to saponify.

The blood-red alkaline solution when agitated with ether parts with some of the red coloring matter (filix red). The residue of this ether extract when distilled with steam furnishes the essential oil of filix; this essential oil appears not to pre-exist in the plant. The residue from this distillation, when extracted with ether, gives, when the ether is evaporated, a red liquid and a precipitate, which, after crystallizing from hot alcohol, forms plates melting at 136·5°, having the composition $C_{20}H_{34}O$. This compound has received the name of *aspidol*. It is insoluble in alkalis, easily soluble in ether, benzene, chloroform, light petroleum, and hot alcohol. It is optically active in a 3 per cent. chloroform solution $[a]_D = -24.08$. The filtrate from this precipitate of aspidol was fractionated into three parts. The first fraction, 130—190°, was a yellow oil with a strong odor and acid reaction, which did not reduce silver nitrate. The second fraction, 220—290°, was a beautiful green oil, which gradually became brown; it has the empirical formula $(C_{27}H_{46}O_2)_n$. The third fraction

[1] Reprinted from Journal of the Chemical Society, 1888, p. 521, and 1889, p. 54. The first part of the paper appeared originally in *Annali di Chimica e Farmacologia*, 1887, p. 69; and the second part relating to the chemistry of filicic acid in *Berichte d. D. Chem. Ges.*, 1888, p. 2962. Compare also the preliminary report in American Journal of Pharmacy, 1886, p. 378.

above 300° (at 200 mm. pressure) corresponds with the formula $(C_{34}H_{58}O_2)_n$.

By precipitating the alkaline solution extracted with ether with sulphuric acid, two resins were obtained: 1st, a brick-red solid melting at 85—93°; 2nd, a more abundant and almost black, plastic mass. The filtrate contains butyric acid.

Filicic acid, prepared by the method already described, has the composition $C_{14}H_{16}O_5$. It is a yellowish, odorless, crystalline powder, melts at 179—180° (uncorr.), and is insoluble in water, almost insoluble in absolute alcohol, moderately soluble in glacial acetic acid, ether, amyl alcohol, and toluene, and readily in chloroform, carbon bisulphide, and benzene. The *benzoyl*-derivative, $C_{21}H_{20}O_6$, separates from dilute alcohol in colorless crystals, melts at 123°, and is very readily soluble in ether, but insoluble in water. The *ethyl* salt, $C_{16}H_{20}O_5$, prepared by treating the acid with alcoholic potash and ethyl iodide, separates from dilute alcohol in reddish crystals, melts at 142°, and is very readily soluble in ether and benzene, but insoluble in water. The *propyl* salt melting at 158°, and the *ethylene* salt melting at 165°, resemble the ethyl salt in appearance and insolubility.

Bromofilicic acid, $C_{14}H_{15}BrO_5$, prepared by treating the acid with bromine in glacial acetic acid solution, chrystallizes from alcohol in red prisms, melts at 122°, and is very readily soluble in absolute alcohol and ether, but insoluble in water.

Anilidofilicic acid, $C_{14}H_{15}O_4NHPh$, obtained by boiling a glacial acetic acid solution of the acid with aniline, separates from alcohol in reddish-violet crystals, melts at 140°, and is soluble in alcohol and benzene, but insoluble in water.

The *hydrazide*, $C_{14}H_{16}O\cdot(N_2HPh)_4$, prepared by boiling an ethereal solution of the acid with phenylhydrazine, crystallizes from ether in red needles, melts at 198°, and is readily soluble in alcohol, but insoluble in water. When the acid (100 parts) is heated above its melting point (compare Luck, *Annalen*, liv. 119), or heated with water at 170—190°, it is decomposed into isobutyric acid (32·5 parts) and a compound, the composition of which is $C_{20}H_{18}O_7$. Hydrochloric acid produces the same decomposition at 150—160°.

Filicic acid is completely oxidized when treated with chromic acid in glacial acetic acid solution, but when a solution of the potassium salt is oxidized in the cold with a two per cent. solution of potassium

permanganate, isobutyric acid and oxalic acid are obtained. The same products are formed when nitric acid of sp. gr. 1·48 is employed. When the acid is treated with zinc-dust in alkaline solution, it is converted into an acid, the composition of which is probably $C_{14}H_{22}O_{11}$, and at the same time a small quantity of isobutyric acid is formed. When treated with sodium in amyl alcohol solution, it yields butyric acid and resinous products.

The compound $C_{20}H_{18}O_7$, referred to above, separates from ether or amyl alcohol as an amorphous, red powder, and has no well-defined melting point. It is soluble in most ordinary solvents, has an acid reaction, decomposes carbonates, and dissolves in alkalis, forming red solutions, from which it is precipitated in red flocks on adding acids. It yields phthalic acid and small quantities of oxalic acid when oxidized with nitric acid of sp. gr. 1·40 in the cold. When reduced with zinc-dust in alkaline solution, it gives a colorless substance which rapidly oxidizes, and is probably reconverted into the original compound.

From the above results, it follows that filicic acid is probably an isobutyric acid derivative of hydroxynaphthaquinone.

RECENT PROCESSES FOR TESTING QUININE.[1]

By W. Lenz.

The foreign alkaloids in commercial quinine consist chiefly of cinchonidine and hydro-bases. Four principal methods are in use for the determination of these. In all these methods a product ("Nebenalkaloïde") is obtained, containing the greater part of the impurities together with a certain quantity of quinine. In this product, the cinchonidine is determined by the "tetrasulphate process." One gram of the mixture is dissolved in 9 grams of absolute alcohol and 3 grams of 50 per cent. sulphuric acid. The mixture is kept at 0° for 24 hours, the acid liquid is removed by suction, the crystals are washed with a little absolute alcohol, and then air-dried. They are then dissolved in water, and the base is precipitated by excess of sodium carbonate. It is dried first over sulphuric acid, and then at 115°. A correction (the amount of which depends on the per centage of cin-

[1] *Zeit. anal Chem.*, xxvii., 549—631; reprinted from *Jour. Chem. Soc.*, 1889, p. 86. See also paper on the same subject by Dr. O. Hesse, in Am. Jour. Phar., 1887, p. 404.

chonidine found) must be applied. The author gives a curve for the purpose. The cinchonidine is very nearly pure. The hydro-bases are determined approximately by oxidizing the quinine and cinchonidine in acid solution by a 1 per cent. solution of potassium permanganate, rendering alkaline, and shaking with ether, followed by chloroform. The residues from these solutions, although very impure, are regarded as hydroquinine.

The "chromate process" was recommended by Dr. De Vrij (see AMER. JOUR. PHAR., 1887, p. 343), and the "oxalate test" by Dr. L.Schaefer (see AMER. JOUR. PHAR., 1887, p. 153). The amount of oxalate prescribed is insufficient for samples containing less than 15 per cent. of water, and the cooling at 20° should be prolonged to one hour. Schaefer's correction of 0·04 gram per 100 cc. appears to be too large.

In Hesse's "bisulphate process" 5 grams of quinine sulphate is dissolved in 12 cc. of normal sulphuric acid by warming, and the solution is allowed to crystallize in a narrow-necked funnel in a cold place. The mother-liquor is withdrawn by a filter-pump into a graduated cylinder, and the crystals washed with three cc. of water. This solution is shaken with 16 cc. of ether (0·721—0·728), then 3 cc. of ammonia (0·96) added, again shaken, and left for 24 hours. The ether is removed by a pipette, the crystals are collected on a filter, washed with water saturated with ether, dried between filter-paper, washed again with ether, and dried.

In the "crystallization process" of Paul and Hesse, 5 grams of quinine sulphate is dissolved in boiling water, and crystallized out four times, using in the first case 150 cc., next 130 cc., and then twice 120 cc. The united mother-liquors are evaporated at a low temperature almost to dryness, the residue dissolved in the smallest possible quantity of dilute sulphuric acid, made up to 20 cc., and shaken with ether and excess of ammonia. The crystals which form are treated as in the bisulphate test. The hydro-bases crystallize in part with the quinine, therefore the mother-liquor should not be used for their determination.

The chromate process gives very varying results, but on the average gives the highest yield of cinchonidine, especially with the purer samples. The oxalate test gives the lowest numbers, but they are more concordant than those of the chromate process. The composition of the bye-product is, however, variable. The bisulphate test

gives results varying considerably. The alkaloids in the ethereal solution ought to be submitted to the process a second and even a third time, but even with this improvement the whole of the cinchonidine is not obtained, and the results vary much, but the composition of the bye-product is more uniform than in the other processes. The crystallization test has the same advantages as the bisulphate test if the crystallization is repeated often enough, and is the process which is least influenced by the presence of hydro-bases. It is, however, tedious. The process of the German Pharmacopœia depends on the fact that the precipitate produced by ammonia in solutions of the alkaloids is soluble in excess of ammonia, but that much less ammonia is required for quinine than for the other alkaloids. The excess of ammonia required varies, however, very considerably with the temperature.

THE METAMERIC AMYL NITRITES.

By Professor Dunstan and W. Lloyd Williams.

The liquid which has hitherto been known to scientific chemists as pure amyl nitrite is a mixture of the metameric nitrites, corresponding to *a*-amyl alcohol or iso-butyl carbinol ($CH(CH_3)_2CH_2CH_2NO_2$) and *β*-amyl alcohol or secondary butyl carbinol ($CH(C_2H_5)CH_3CH_2NO_2$). The relative proportions of these two nitrites in the mixture are dependent on the composition of the "amyl alcohol" from which they have been prepared. The respective quantities of these two metameric alcohols contained in different specimens of fusel oil are subject to variation. The quantity of the *a*-amyl alcohol, which is optically inactive, is always much larger than that of *β*-amyl alcohol, which is lævorotatory. In the portion of fusel oil which has been repeatedly fractionated between 127°–132°, there is said to be usually about 13 per cent. of the active alcohol. These alcohols cannot be separated by fractional distillation, since the *a*-amyl alcohol boils at 128° C. and the *β*-amyl alcohol at 131° C. Their separation is a matter of very great difficulty, and it has seldom been accomplished.

Our first experiments related to the properties of the mixture of these two nitrites. The statements of different observers about its properties are inconsistent, the boiling point being variously stated at almost every temperature between 90° and 99° C. These discrepancies are no doubt in part due to the employment for the preparation of the

nitrites, of more or less perfectly rectified fusel oil. The fraction boiling between 127°–132° C., is known in commerce as "amyl alcohol," and unless the operation of fractional distillation has been many times repeated, the liquid is liable to contain more or less iso-butyl alcohol (b. p. 108·4°). On account of the difficulty of completely removing iso-butyl alcohol, as well as substances of higher boiling-point, from fusel oil by distillation, we decided to make our first experiments with amyl alcohol which had been otherwise purified. Advantage was taken of the superior solubility of the barium salt of iso-butyl sulphuric acid.

About 300 grams of the fraction of fusel oil which had been repeatedly distilled between 127°–130° C. were warmed for some days with an equal quantity of sulphuric acid. The liquid was then poured into 5 litres of water. The dark oily layer which separated was removed, and the clear liquid neutralized with barium carbonate. This solution of the barium salts of iso-butyl sulphuric acid and the two amyl-sulphuric acids was evaporated to about one-third of its original volume. The salts deposited on cooling the liquid were many times recrystallized from water. By this means the more soluble barium iso-butyl sulphate was removed, together no doubt with some of the barium β-amyl sulphate, which is rather more soluble than barium α-amyl sulphate. From the mixed barium salts the alcohols were regenerated by conversion into the sodium salts, which were distilled with diluted sulphuric acid. The resulting alcohols were dried by digestion with ignited potassium carbonate and distilled. Nearly the whole of the liquid came over at 129° C. The specific gravity was ·813 at 15° C. (water at 15°=1). The rotatory power at 15° C. determined with Laurent's instrument in a column 200 mm. long was —1·35°. The maximum rotation observed by Ley in a specimen of β-amyl alcohol was —8·8° for a column 200 mm. long, so that the specimen above described contained 84·66 per cent. of α-amyl alcohol and 15·34 per cent. of β-amyl alcohol. The alcohols were now converted into the nitrites by reaction with sulphuric acid and sodium nitrite. The respective quantities of the materials used were calculated from the equation

$$2C_5H_{11}OH + H_2SO_4 + NaNO_2 = 2C_5H_{11}NO_2 + Na_2SO_4 + 2H_2O.$$

The method was very successful, and the nitrites thus easily prepared were washed with a solution of potassium carbonate and dried by digestion with the ignited salt. The liquid entirely distilled between

96°–97° C. and was *dextrorotatory*. The lævorotatory β-amyl alcohol had given rise to a dextrorotatory nitrite. Le Bel (*Bull Soc.* [2], xxv., 545) has shown that the amyl chloride, bromide and iodide prepared from the lævorotatory alcohol are also dextrorotatory.

The physiological action of the mixture of α-amyl and β-amyl nitrites thus prepared has been investigated by Professor Cash, who finds that it produces in animals a rapid fall of blood pressure, an acceleration of the pulse-rate, and a slowing of the respiratory movements, although it does not appear to act so powerfully in these respects as iso-butyl nitrite.

In order to separate these two metameric nitrites, it was necessary first to obtain the corresponding alcohols. The separation of the two alcohols was first effected by Pasteur (*Compt. Rend.*, xli., 296), by converting them into two barium amyl-sulphates, and repeatedly recrystallizing these salts from water, by which means it is possible to obtain the pure salt corresponding to the inactive alcohol, and after several further series of recrystallizations of the residual salts, that corresponding to the active alcohol; the barium salt of β-amyl-sulphuric acid being about two and a half times more soluble than the barium salt of α-amyl-sulphuric acid. This process of isolation is very laborious, and has not often been repeated; in fact, it is doubtful whether the active alcohol has yet been obtained pure, since specimens prepared by different observers have not exhibited the same rotatory power. Le Bel has proposed to separate the two alcohols by the prolonged action of gaseous hydrochloric acid, when the inactive alcohol is more readily attacked and converted into the chloride, than the active alcohol. It seems however from the experience of other observers that this method is hardly less tedious than Pasteur's, and as the latter method had already been successfully employed by Pedler, we decided to attempt to effect the separation by its means.

Fusel oil, which had been distilled with steam, was dried and fractionated. The fraction obtained between 127°–132°, after having been several times redistilled, exercised a rotation of −1° (for the D ray), in a tube 200 mm. long, at 15° C., the determination being made in Laurent's instrument. If we take −8·8° (Ley) as the rotatory power of the active alcohol under the same conditions, then this liquid was constituted of 88·64 per cent. of α-amyl alcohol and 11·36 per cent. of β-amyl alcohol. Aboul 1½ litre was warmed for one week with an equal weight of sulphuric acid, the mixture was largely di-

luted with water, neutralized with barium carbonate, and filtered. The solution was concentrated and fractionally crystallized, the fractions, which were early obtained, were isolated and separately recrystallized about twenty-three times. From some of the salt thus purified the alcohol was regenerated, dried and distilled. It boiled at 129°–130° C., and at 15° C. its specific gravity was ·813. The liquid was found still to possess rotatory power. At 15° C. in a tube 200 mm. long the rotation was observed to be –0·45°, so that the repeated recrystallization of the barium salts had only removed two-thirds of the active alcohol which the liquid originally contained. The regenerated liquid still contained 5·1 per cent. of the active alcohol. Since a comparison of the physiological effects of several specimens of *a*-amyl nitrite, associated with different amounts of *β*-amyl nitrite, with the physiological effect of pure *a*-amyl nitrite, would enable the action of *β*-amyl nitrite to be inferred, the above-mentioned alcohols were converted into the nitrites, and their action is being physiologically examined by Professor Cash. The nitrites boiled at 96°–97°, and the specific gravity of the liquid was 0·874 at 15° (water at 15°=1).

The remainder of the barium salts was now dissolved in a large quantity of water, and the dilute solution allowed to crystallize slowly. The salt obtained was separated from the mother-liquid and again recrystallized twelve times. The barium salt had now been recrystallized thirty-five times. On regenerating the alcohol and drying it, the boiling point was found to be 131° C. (bar. 759 mm.), the whole of the thermometric column being immersed in the vapor. The specific gravity of the liquid at 15° C. was 0·8140 (water at 15°=1). The alcohol was now practically inactive, the rotation effected in a column 200 mm. long being only one-tenth of a degree.[1] The nitrite was now prepared from this alcohol by the method which has been previously described, and its characters have been carefully examined. It was shown to be pure by the method which has already been alluded to. (Weight of liquid taken 0·1787 gram; pure amyl nitrite found 0·1797 gram.). The boiling point determined with a standard thermometer is 97° C. (bar. 758·5 mm). Its specific gravity at 15° is 0·880 (water at 15°=1). The liquid was virtually inactive, showing a dextrorotation in a tube 200 mm. long of only one-twentieth of a degree.

[1] A specimen prepared by Pedler and recently examined by Dr. Perkin (*Journ. Chem. Soc.*, 1884, 470), exhibited a rotation of –0·9° in a column 200 mm. long. The specific gravity at 15° was 0·8135, and the boiling point 131·5° C.

a-amyl nitrite is a pale yellow liquid having a not disagreeable odor, and producing when inhaled the characteristic nitrite-effect. Its physiological action is being investigated by Professor Cash.—*Phar. Jour. and Trans.*, Dec. 22, 1888, p. 487.

SOLUBILITY AND ESTIMATION OF PARAFFIN.[1]

By B. Pawlewski and J. Filemonowicz.

The following table gives the solubility at 20° of ozokerit paraffin of sp. gr. 0·9170 at 20°, melting at 64–65°, and solidifying at 61–63°:

Solvent.	Paraffin (grams,) disolved by		Weight of solvent required to dissolve completely 1 part of paraffin.
	100 grams.	100 cc.	
Carbon bisulphide	12·99	—	7·6
Light petroleum up to 75° C., sp. gr. 0·723	11·73	8·48	8·5
Turpentine oil, sp. gr. 0·857; b. p. 158—166°	6·06	5·21	16·1
Cumene (comm.), up to 160°, sp. gr. = 0·867	4·28	3·72	23·4
Cumene (frac.), 150—160°, sp. gr. = 0·847	3·99	3·39	25·0
Xylene (comm.), 135—143°, sp. gr. = 0·866	3·95	3·43	25·1
Xylene (frac.) 136—138°, sp. gr. = 0·864	4 39	3 77	22·7
Toluene (comm.), 108—110°, sp. gr. = 0·866	3·83	3·34	26·1
Toluene (frac), 108·5—109·5°, sp. gr. = 0·866	3·92	3·41	25·5
Chloroform	2·42	3 61	41·3
Benzene	1·99	1·75	50·3
Ethyl ether	1·95	—	50·8
Isobutyl alcohol (comm.) sp. gr. = 0·804.	0 285	0·228	352·0
Acetone, 55·5—56·5°, sp. gr. = 0·797	0·262	0·209	378·7
Ethyl acetate	0.238	—	419·0
Ethyl alcohol, 99·5° Tr	0·219	—	453·6
Amyl alcohol, 127—129°, sp. gr. = 0·813	0·202	0·164	495·3
Propionic acid	0·165	—	595·3
Propyl alcohol	0·141	—	709·4
Methyl alcohol, 65·5—66·5°, sp. gr. = 0·798	0·071	0·056	1447.5
Methyl formate	0·060	—	1648.7
Glacial acetic acid	0·060	0·063	1668·6
Ethyl alcohol, 94·5° Tr	0·046	—	2149·5
Acetic anhydride	0·025	—	3856·2
Formic acid (cryst)	0·013	0·015	7689·2
Ethyl alcohol, 75° Tr	0 0003	—	330000·0

[1] *Berichte d. D. Ch. Ges.*, xxi., p. 2973; reprinted from *Jour. Chem. Soc.*, 1889, p. 82.

The liquid constituents present in many products of the petroleum or ozokerit industry are soluble in glacial acetic acid, whereas vaselin, cerisin, ozokerit, and paraffin are almost insoluble. To estimate the quantity of solid paraffin in petroleum, lubricating oils, mineral oils, vaselin, etc., 5—20 cc. of the mixture is well shaken with 100—200 cc. of glacial acetic acid, the residual paraffin thrown on to a weighed filter, washed two or three times with glacial acetic acid, and then two or three times with alcohol of 75°. Tr., dried and weighed, or the residual paraffin is washed, dissolved in benzene or ether, the solution evaporated, and the residue weighed. This method is quick and accurate, and can be carried out at the ordinary temperature.

THE CHEMICAL CONSTITUENTS OF AMYL NITRITE USED IN MEDICINE.

By Professor Dunstan and E. J. Woolley.

The "amyl nitrite" of the British Pharmacopœia is prepared by the action of "nitric or nitrous acid" on amyl alcohol which has been distilled between 128°–132° C. The constituents of the nitrite thus obtained must be subject to considerable variation, being dependent not only on the use of "nitric or nitrous acid," but also on the composition of the crude amyl alcohol, as well as on the extent to which the operation of fractionally distilling the alcohol has been carried. From a consideration of the constituents of fusel oil or crude amyl alcohol it seemed likely that the official nitrite might contain iso-butyl nitrite, *α*-amyl nitrite, *β*-amyl nitrite, and perhaps primary propyl nitrite, although neither the nitrite of propyl nor the nitrite of iso-butyl appears to have been mentioned by previous workers on the subject as a possible constituent of the liquid. It is known that the substance contains unaltered amyl alcohol, besides oxidation products, such as valeric aldehyde and valeric acid, amyl valerate, etc., these compounds being noticed to occur to the largest extent when nitric acid is employed in the preparation of the nitrite. The employment of nitric acid has also been stated to give rise to the formation of some amyl nitrate, and the production of hydrocyanic acid has been observed. To these non-nitrite constituents, as they may be termed, we have not paid any special attention in the course of the present inquiry, since there is no evidence that the therapeutic value of the liquid is dependent on their presence.

Two specimens of the official "amyl nitrite" have been examined; both of them were obtained of well-known manufacturers. In order to separate a sufficient quantity of the constituent nitrites for identification, recourse was had to several series of fractional distillations.

The first specimen examined had been obtained from a maker of great repute. Half a litre was distilled from a flask fitted with a long tube carrying a T-piece, the thermometric column being entirely immersed in the vapor.

The liquid commenced to distil at 77° C., and the following nine fractions were collected. A dark-colored residue containing amyl alcohol and other substances remained in the flask.

I.	77°– 82°	= 30 cc.
II.	82°– 88°	= 23 cc.
III.	88°– 93°	= 140 cc.
IV.	93°–100°	= 138 cc.
V.	100°–105°	= 52 cc.
VI.	105°–110°	= 24 cc.
VII.	110°–120°	= 17 cc.
VIII.	120°–125°	= 12 cc.
IX.	125°–132°	= 20 cc.

This process of fractional distillation was repeated five times with each of these nine portions. A considerable quantity of liquid was thus obtained between 67°–69°, and again between 94°–98°. These liquids were again distilled and the fractions collected at 67°, and 96° respectively. The specific gravity of the liquid boiling at 67° was ascertained to be 0·8755 at 15° (water at 15°=1). The nitrite was estimated in the compound, and it was found to correspond almost exactly with that contained in iso-butyl nitrite (0.1756 gram. of liquid yielded an amount of nitric oxide corresponding to ·1746 gram. $C_4H_9NO_2$). The physical and chemical properties of the liquid were thus shown to be identical with those of pure iso-butyl nitrite. This compound constituted about 10 per cent. of the original "amyl nitrite." The liquid which boiled nearly constantly at 96° was next examined. Its specific gravity was 0·878 at 15° (water at 15°=1). The amount of nitrite contained in it was almost the same as that contained in amyl nitrite (0·211 gram yielded an amount of nitric oxide corresponding to 0·2099 gram of $C_5H_{11}NO_2$). This liquid was evidently a mixture of α-amyl nitrite (b. p. 97°) and β-amyl nitrite (b. p. 94° circa). The presence of the β-amyl nitrite was proved by the

dextro-rotation exercised by the liquid. The quantity of the amyl nitrites contained in the original substance was about 50 per cent.

A specimen obtained from another well-known maker had evidently been prepared from very imperfectly rectified fusel oil, and in all probability by the action of nitric acid. When half a litre was fractionally distilled a liquid was obtained at 20° which after redistillation proved to be chiefly ethyl nitrite (b. p. 17°). Liquid distilled at all temperatures between 20°–55° and at 55°, 65 cc. had been obtained. This fraction, when submitted to redistillation, yielded primary propyl nitrite. Between 55°–70° 53 cc. of liquid passed over, and after this had been many times fractionally redistilled iso-butyl nitrite (b. p. 67°) was obtained. Between 70°–80° 60 cc. distilled and between 80°–90° 35 cc. By distilling these fractions, together with residues from the distillation of lower fractions, a mixture of *a*-amyl nitrite and *b*-amyl nitrite boiling at 96° was isolated. It was shown by analysis to be almost pure (0·211 gram. of liquid yielded an amount of nitric oxide equivalent to 0·2109 gram. of $C_5H_{11}NO_2$). By continuing the fractional distillation about 50 per cent. of liquid was collected above 100°. In this liquid were recognized unaltered amyl and other homologous alcohols, valeric acid and amyl valerate, but it was not minutely examined. The total amount of the amyl nitrites obtained constituted less than·40 per cent. of the original liquid.

Professor Cash has observed that pure iso-butyl nitrite acts more powerfully than the mixture which constitutes the official "amyl nitrite."

We wish to thank Miss L. E. Boole and Mr. Frank Browne for having confirmed, by an independent series of experiments, the results which are recorded in this paper.—*Phar. Jour. and Trans.*, Dec. 22, 1888, p. 489.

PHOTOGRAPHY.

By F. V. Butterfield.

(*Continued from page* 103.)

The first thing required in the silver salt process is some ready-sensitized albumenized paper; this can now be bought very cheaply, and consists of paper coated on one side with egg-albumen, containing also in its solution a certain amount of ammonium chloride. When dry it is sensitized by floating it on a bath of silver nitrate (made also of a particular strength), the chloride and silver nitrate of course at once reacting, the change being expressed by the equation—$NH_4Cl+AgNO_3=AgCl+NH_4NO_3$.

But at the same time the albumen is also coagulated, forming an insoluble compound, said to be silver albuminate, and thus the silver chloride simultaneously formed is prevented from sinking into or being absorbed by the texture of the paper.

Placing the negative in a printing frame, constructed for the purpose, with the film side up, lay on it a piece of the sensitized paper, cut to the proper shape and size with the albumenized surface down, and having super-imposed a few pieces of blotting paper, to ensure close contact between the printing paper and the negative; fasten on the back. Next expose it to a good even light, examining the print by means of the hinged back of the frame, from time to time. It will be found necessary to print a little deeper than the required result, the subsequent processes of "toning" and "fixing" always tend to make the finished photograph a little lighter in color.

The chemistry of silver printing is still obscure. We have, as just shown, a sheet of paper made sensitive to light, by coating it with a mixture of silver chloride and silver albuminate; ammonium nitrate, a trace of free silver nitrate and a little citric acid usually added as a preservative being also present. On exposure to the light as beneath the negative, it is darkened in color, caused of course by the action of the light on the silver chloride and albuminate, the former being reduced to the theoretical subchloride, Ag_2Cl, and the latter, as an organic salt of silver, to a sort of sub-oxide. But our actual knowledge of what really takes place is very slight, and little progress in the matter has been made since the days of Scheele.

Having then obtained several prints from the negative, they must next be washed in two or three changes of water, allowing a few minutes for each immersion, and the last wash-water should be only slightly milky. They are then ready for the process of "toning," which really consists in gilding the silver image, thereby making the finished photograph much more pleasing in appearance and greatly increasing its durability and permanency.

Of the numerous toning solutions, I recommend the "acetate," which is made as follows:—

℞. Auri chlorid	grs. viiss.
Sodii acetat	ʒiv.
Aq. dest.	ad Oij.

This solution, like good wine, improves with keeping, and is better prepared at least two days before required for use. Its action on the washed prints would appear to be, according to Captain Abney, expressed by the equation:—$2\,AuCl_3 + NaC_2H_3O_2 = Au_2 + NaC_2Cl_3O_2 + 3HCl$.

The washed prints are then put into it, one by one, face downwards, and kept in constant motion to prevent overlapping and consequent uneven toning. When their foxy red color has gradually turned to a purple tint the operation is complete, and they are at once taken out and immersed in a weak solution of sodium chloride, which immediately arrests any further action of the toning bath, then finally transferred to the "fixing" bath, which, as before, consists of a solution of hypo, 4 ounces to the pint, and after having been allowed to remain in it for about ten minutes they must

be taken out and thoroughly washed, because the least trace of "hypo" left in the prints will cause them, sooner or later, to fade. For convenience in washing I have found the "Godstone" rocking tray answer admirably, and it is also one of the cheapest in the market.

The addition of a little sol. hydrogen peroxide has been recommended for the elimination of the last traces of "hypo," which it oxidizes into innocuous acid sulphate, thus :— $Na_2S_2O_3+4\ H_2O_2=2NaHSO_4+3\ H_2O$.

The last wash-water may also be tested by the "iodide of starch" reaction for traces of "hypo."

The end of the various chemical processes has now been reached; it only remains to trim the prints to the exact size required, by means of the cutting shapes sold for the purpose, and mount them on the usual pieces of pasteboard. For this purpose I find nothing succeeds like starch paste made *sec. artem.*

A burnisher supplies the finishing touch, greatly improving their appearance by imparting a glossy surface, but this, of course, is by no means necessary.

The intending beginner will find his greatest difficulty at the commencement to be *correct* exposure. For his under-exposed plates there is no remedy, but those a little "over" may be sometimes turned to good account by resorting to intensification. This is effected by placing the negative in a saturated aqueous solution of mercuric chloride, until the requisite amount of density is obtained. The action of the intensifier being:—

$$\underset{\text{Silver forming the image.}}{Ag+HgCl_2} = \underset{\text{Double chloride of mercury and silver.}}{AgCl\cdot HgCl}.$$

The plate is then well washed under the tap, and put into a dilute solution of NH_4HO, when the bleached appearance of the film is instantly turned to a jet black, caused by the action of the ammonia on the mercurous chloride, which it converts into mercurous ammonium chloride, the silver chloride being for the most part dissolved away,

$$2HgCl+2NH_4OH=NH_2Hg_2Cl+NH_4Cl+2H_2O,$$

and

$$AgCl+2NH_4OH=AgNH_4NH_2Cl+2H_2O.$$

In contradistinction to the above, we have, also, what is termed "thinning" or "reducing" the negative.

This is requisite when, during the necessarily prolonged development of a slightly *under*-exposed plate, with the aim of bringing out some more detail in the shadows, the high lights have become too dense for printing. A method recommended by H. P. Robinson answers fairly well. It consists in first wetting the refractory negative in water to swell the gelatine, then soaking it in a weak solution of calx. chlorinata, until the requisite amount of reduction has taken place.

It is also a good practice to varnish the negative before taking any prints from it, as, unless the film and the printing paper are both in a perfectly dry state, some free silver nitrate from the latter is liable to cause stains on the

negative. A suitable varnish may be made from seed-lac and methylated spirit, about 3 ounces of the former to a pint of the latter. Before using, the back of the negative is gently warmed over a spirit lamp or before the fire, and a pool of varnish poured on the film, allowed to run over the entire surface, and then drained off at the opposite corner.

The alkaline "pyro" developer always stains the film more or less, thus retarding the subsequent process of printing; it is usual, therefore, to put the plate directly after development and just before fixing into what is called the "clearing" solution. This consists of a solution of citric acid and alum, about an ounce of each to a pint of water, care being taken afterwards to rinse the plate well in clean water before immersing it in the bath of "hypo," as the acid it contains is liable to decompose the sodium thiosulphate, liberating hyposulphurous acid, which at once splits up into sulphurous acid and free sulphur, which is deposited in the film.

$$2H_2S_2O_3=2H_2SO_3+S_2.$$

The solution of "hypo" used for "fixing" plates or prints may be used over and over again for subsequent batches, but it must not on any account, through too frequent use, be allowed to get too *weak*, because sodium thiosulphate forms *two* double salts with silver chloride, one being soluble, the other *in*soluble, and with a weak solution there is great danger of the latter being formed:—$AgCl+Na_2S_2O_3=AgNaS_2O_3+NaCl$.

(*To be concluded*).

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 19th, 1889.

On motion of Dr. C. B. Lowe, Wm. B. Webb, Ph. M., was called to preside. The minutes of the last meeting were read and no alterations being required they stand approved.

The Registrar reported that there had been presented to the library the following works: Proceedings of the American Pharmaceutical Association for 1888; Notes of Professor Curtman's Lectures reported by Professor H. M. Whelpley, two volumes; Pharmacopœia of the London Throat Hospital; Report of the Pennsylvania State Board of Health, 1886 and 1887; Report of the Illinois Board of Pharmacy, 1887, and Report of the Commissioner of Education for 1886–87. Appropriate acknowledgements of the same have already been made.

The Registrar read a paper by J. W. England, Ph. G., who was unable to be present, upon *tincture of mustard*. A discussion ensued upon the subject and it was suggested that it would be well to state that the maceration, after moistening the drug with water and after transferring it to the percolator, should be effected in closed vessels to prevent loss of the volatile oil.

A paper upon *hydrangin* by H. J. M. Schrœter, Ph. G., was read and listened to with much attention. Some conversation ensued and Wm. Webb remarked that when the fluid extract was introduced it was recom-

mended to prepare it by decocting the drug two or three times in water, evaporating and adding honey, and that the entire root was used. Professor Maisch thought that the bark was probably the efficacious part of the drug, since the woody part of the root was nearly tasteless. Mr. Schrœter stated that the whole root had been employed in his experiments. Professor Maisch in reply to a query, stated that the Hydrangea arborescens was indigenous to this country and grew wild in the neighborhood of Philadelphia; but that the ornamental garden flower was the Hydrangea hortensis, a Chinese plant, the natural color of whose flowers was pink, the bluish shade frequently seen being due to the absorption of iron in the soil. The paper of Mr. Schrœter was illustrated with a number of samples, showing the reactions of hydrangin with different tests.

The third paper was by Mr. F. B. Quackenbush, of the present senior class upon *Asdepias Cornuti and A. tuberosa*; and Dr. Lowe read a short paper upon *immature cubebs.* All these papers were referred to the Publication Committee. In answer to a question Professor Maisch stated that the ovary of the cubeb flower was at first sessile, but later on, probably after fertilization produced the so-called stalk.

Dr. Lowe stated that he was not yet prepared to make a report upon the question referred to him last month, relative to the *quality of the tar* now supplied, but some enquiries had been made and enough had been learned to show that nearly all that is offered to the trade is a mixture of wood tar with coal tar.

There being no further business a motion to adjourn was put and carried.

T. S. WIEGAND,
Registrar.

EDITORIAL DEPARTMENT.

The Alumni Association of the Philadelphia College of Pharmacy will celebrate their 25th anniversary by holding in the College Hall an exhibition representing the progress made in pharmacy, and allied arts and sciences, by its members. The exhibition will be held on the 13th, 14th and 15th of March, during the day and evening, from 10 A. M. to 10 P. M., and from the number of graduates and members who have already engaged space there will certainly be an interesting exhibition. It is also the intention to place upon the tables many objects illustrating the pharmacy of the past.

Filters.—Mr. Edo Claassen calls our attention to a clerical error which remained uncorrected in proofreading of his paper published in our February number. By substituting the word *millimeters* for centimeters on page 74, and the designation *mm.* for cm. referring to the illustrations on page 75, the dimensions will be more correctly indicated.

Mr. Claassen also states, that it will be found advantageous in many cases to again fold the narrow strip (indicated in the figures by dotted lines) by bringing its lower end, commencing at the angle, over to the inner crease, thus forming a small triangle; and in case the neck of the funnel should be

unnecessarily large, to support the filter in a cone of writing paper, folded like a plain filter, but having the point cut off sufficiently for permitting the lower end of the filter to project through the aperture.

The excursion to the Pacific Coast in connection with the meeting of the American Pharmaceutical Association, to be held at San Francisco, June 24th, has been announced to start from Chicago, St. Louis and Memphis on Friday, June 14th, and to reach Denver Sunday morning at 7 o'clock. After a trip through Clear Creek Cañon to Idaho Springs, Georgetown, Silver Plume and Graymount, the train will leave Denver on Tuesday evening for Salt Lake City, where it is contemplated to spend two days, and then continue the journey westward so as to reach San Francisco on Sunday, June 23, at 11 A. M. The tickets on this train are limited to 150, and the price for each ticket has been fixed at $160 from Chicago, $150 from St. Louis or Memphis, and $140 from Kansas City, for the *round trip;* the ticket entitles for the *outward trip* to sleeping car and first-class hotel accommodations, meals, special carriage drives, transportation of 150 pounds of baggage, and all the necessary transfers until the hotel at San Francisco is reached. The return ticket will be good for six months.

This special train has been designated as the *Western and Southern Official train of the Association.* No arrangements appear to have been made for members residing east from the points mentioned above, but we presume that they will be announced at some future time.

OBITUARY.

Imformation of the death of the following graduates of the Philadelphia College of Pharmacy has been received:

Richard Price, class 1835, died in Philadelphia, November 27, 1888, aged 74 years. His thesis on senega was published in this Journal, vol. viii. p. 92.

Benjamin B. Davis, class 1850, died at Willow Grove, Pa., August 18, 1888. For a number of years he had been a resident of Eufaula, Ala.

C. Collins Hughes, class 1857, died December 4, 1888, at his late residence, Eighth and Race streets, where he had been in business for several years.

Jos. Vincent Wingert, class 1878, died at Pottsville, Pa., January 29, last. He had been in business in his native town for nearly ten years.

Thos. M. Galbreath, class 1880, a native of Maryland, died January 25, last, at Atlantic City, N. J., where he had been in business for some time.

Robert L. Hesson, of Philadelphia, class 1884, died at Curllsville, Clarion county, Pa., May 25, 1885.

John George Engler, class 1885, lost his life in his native city Hartford, Conn., on the morning of February 18, when through the explosion of the steam boilers the Central Park Hotel was wrecked and twenty-three persons were killed. Mr. Engler was a faithful student and at the time of his graduation, was awarded the John M. Maisch prize.

Everett V. Alexander, class 1886, died at his home in McConnellville, Ohio, February 19, 1889.